What is claimed is:

1. A method of calibrating a gyro of a spacecraft comprising:

determining a roll gyro bias residual in response to a yaw attitude residual; and

calibrating the gyro in response to said roll gyro bias residual.

2. A method as in claim 1 wherein determining a yaw attitude residual comprises:

determining a first yaw attitude of the spacecraft;

determining a second yaw attitude of the spacecraft; and

determining yaw attitude residual in response to said first yaw attitude and said second yaw attitude.

3. A method as in claim 1 further comprising adjusting update gain of said roll gyro bias residual in response to a thermal model estimation.

4. A method as in claim 3 wherein adjusting update gain of said roll gyro bias residual comprises determining said update gain via a Kalman filter.

5. A method as in claim 1 further comprising calibrating the gyro at a first periodic rate during an initialization period and calibrating the gyro at a second periodic rate upon expiration of said initialization period.

6. A method as in claim 1 further comprising summing said roll gyro bias residual with a previous roll gyro bias estimation to generate a current roll gyro bias estimation.

7. A method as in claim 1 wherein calibrating the gyro is implemented via on-board flight software.

8. A method as in claim 1 wherein calibrating the gyro is implemented via ground based operational software.

9. A method as in claim 1 wherein calibrating the gyro is performed approximately once per orbit and near a beginning portion of a gyro calibration period.

10. A method as in claim 1 wherein calibrating the gyro is performed using at least one yaw attitude signal sample per orbit near a beginning portion of a gyro calibration period.

11. A method as in claim 1 wherein said yaw attitude residual is determined using a plurality of yaw attitude signal samples per orbit near a beginning portion of a gyro calibration period.

12. A method as in claim 11 further comprising weighted averaging said plurality of yaw attitude signal samples.

13. A method of reorienting a spacecraft comprising:

determining a first yaw attitude of the spacecraft;

determining a second yaw attitude of the spacecraft;

determining a yaw attitude residual in response to said first yaw attitude and said second yaw attitude;

determining a roll gyro bias residual in response to said yaw attitude residual;

calibrating said roll gyro in response to said roll gyro bias residual;

estimating attitude of the spacecraft in response to spacecraft attitude determined by said calibrated roll gyro; and

reorienting the spacecraft in response to said estimated attitude.

14. A gyro calibration system for a spacecraft comprising an attitude estimator determining a roll gyro bias residual in response to a yaw attitude residual and calibrating the gyro in response to said roll gyro bias residual.

15. A system as in claim 14 further comprising:

a reference sensor generating a first yaw attitude signal;

a gyro generating a second yaw attitude signal; and

said attitude estimator determining yaw attitude residual in response to said first yaw attitude signal and said second yaw attitude signal.

16. A system as in claim 15 wherein said reference sensor is a sun sensor.

17. A system as in claim 14 wherein said attitude estimator is at least partially part of the spacecraft flight software.

18. A system as in claim 14 wherein said attitude estimator is at least partially part of a ground operation software.

19. A system as in claim 14 further comprising a filter filtering said first yaw attitude signal.

20. A system as in claim 14 wherein said attitude estimator adjusts update gain of said roll gyro bias residual in response to a thermal model prediction.

21. A system as in claim 20 wherein said attitude estimator adjusts update gain of said roll gyro bias residual via a Kalman filter.

22. A spacecraft reorientation system comprising:

a reference sensor generating a first yaw attitude signal;

a gyro-compassing generating a second yaw attitude signal;

an attitude estimator determining yaw attitude residual in response to said first yaw attitude signal and said second yaw attitude signal, determining roll gyro bias residual in response to said yaw attitude residual, and calibrating said roll gyro in response to said roll gyro bias residual;

said attitude estimator estimating attitude of the spacecraft at least in part in response to spacecraft attitude determined by said calibrated roll gyro; and

a controller reorienting the spacecraft in response to said estimated attitude and a desired attitude.

23. A method of calibrating a gyro of a spacecraft comprising:

determining measured attitude of the spacecraft; and

gain scheduling gyro calibration and attitude determination using at least partially a measured attitude during a yaw transient period.

24. A method as in claim 23 wherein gain scheduling comprises using a gain scheduling signal during the yaw transient period.

25. A method as in claim 24 wherein using a gain scheduling signal comprises using a yaw transient error.

26. A method as in claim 24 wherein using a gain scheduling signal comprises using a sun sensor measurement.

27. A method as in claim 24 wherein using a gain scheduling signal comprises using ephemeris.

28. A method as in claim 23 wherein gain scheduling comprises disabling gyro calibration for at least one attitude axis during an initial period when the sun comes within a field of view of the sun sensor.

29. A method as in claim 23 wherein gain scheduling comprises disabling gyro calibration for at least one attitude axis during a period when a yaw attitude error is greater than a predetermined value.

30. A method as in claim 23 wherein gain scheduling comprises disabling gyro calibration for at least one attitude axis during said yaw transient period.

31. A method as in claim 23 wherein performing gain scheduling comprises varying gyro bias update gain for at least one attitude axis from low to nominal during said yaw transient period.

32. A method as in claim 23 wherein performing gain scheduling comprises varying attitude update gain of at least one attitude axis from high to nominal during said yaw transient period.

33. A method as in claim 23 wherein gain scheduling comprises resetting attitude covariance of at least one axis to a high value.

34. A method as in claim 23 wherein gain scheduling comprises resetting gyro covariance of at least one axis to a low value.

35. A gyro calibration system for a spacecraft comprising an attitude estimator gain scheduling gyro calibration and attitude determination for a yaw transient period.

36. A system as in claim 35 wherein said attitude estimator in gain scheduling gyro calibration and attitude determination disables gyro calibration for at least one attitude axis during said yaw transient period.

37. A system as in claim 35 wherein said attitude estimator in gain scheduling gyro calibration and attitude determination varies attitude update gain of at least one

attitude axis from high to nominal during said yaw transient period.

38. A system as in claim 35 wherein said attitude estimator in gain scheduling gyro calibration and attitude determination resets attitude covariance of at least one attitude axis to a high value during said yaw transient period.

39. A system as in claim 35 wherein said attitude estimator in gain scheduling gyro calibration and attitude determination varies gyro bias update gain of at least one attitude axis from low to nominal during said yaw transient period.

40. A system as in claim 35 wherein said attitude estimator in gain scheduling gyro calibration and attitude determination resets gyro bias covariance of at least one attitude axis to a low value during said yaw transient period.